We claim:

1. In a vehicle drive line having an engine controlled by a throttle position, a method for controlling a clutch that driveably connects an input and an output with varying degrees of clutch engagement, the method comprising the steps of:

operating the clutch partially engaged;

determining a current throttle position, throttle rate, and vehicle speed;

determining a first desired clutch engagement corresponding to the current throttle position and vehicle speed;

determining a second desired clutch engagement corresponding to the current throttle rate and vehicle speed; and

changing the degree of clutch engagement to the greater of the first desired clutch engagement and the second desired clutch engagement.

2. The method of claim 1, further comprising:

determining a length of a first period that begins upon initiating partial engagement of the clutch;

reducing the first desired clutch engagement by a factor whose magnitude varies inversely with the length of the first period; and

changing the degree of clutch engagement to the greater of the first desired clutch engagement and the second desired clutch engagement.

3. The method of claim 2, further comprising:

maintaining the first desired clutch engagement for a second period of predetermined length.

4. The method of claim 1, further comprising:

determining a reference clutch engagement;

determining a difference between the second desired clutch engagement and the reference clutch engagement;

reducing the second desired clutch engagement by a magnitude that varies directly with said difference; and

changing the degree of clutch engagement to the greater of the first desired clutch engagement and second desired clutch engagement.

5. The method of claim 1, wherein the step of reducing the second desired clutch engagement further comprises:

subtracting from the second desired clutch engagement a magnitude that decreases as the magnitude of said difference decreases.

6. The method of claim 1, wherein the step of operating the clutch in a partially engaged condition includes the steps of:

determining a current clutch slip;

establishing a first desired portion of the input torque to be transmitted by the clutch to the second output;

determining a first magnitude of clutch torque corresponding to the first desired portion;

determining a second magnitude of clutch torque to be transmitted to the second output in proportion to the current clutch slip; and

changing the magnitude of torque transmitted by the clutch to the sum of the first and second magnitudes.

7. The method of claim 1, wherein the step of increasing the degree of clutch engagement over a period sufficient to reduce the calculated temperature of the clutch includes the step of fully engaging the clutch.

8. A method for controlling, with the aid of a digital computer, a clutch that driveably connects an input and an output with varying degrees of clutch engagement, the clutch operating in a vehicle driveline that includes an engine controlled by throttle position, the method comprising the steps of:

inputting to and executing in the computer a computer readable program code algorithm for operating the clutch partially engaged;

providing the computer with a data base including at least a first desired clutch engagement that varies with the current throttle position and vehicle speed, and a second desired clutch engagement that varies with a current throttle rate and a current vehicle speed;

providing a signal in the computer representing the current throttle position, and vehicle speed;

repetitively determining in the computer at frequent intervals during execution of the algorithm the current throttle rate, the first desired clutch engagement corresponding to the current throttle position and vehicle speed, and the second desired clutch engagement corresponding to the current throttle rate and vehicle speed;

issuing from the computer a command clutch duty cycle signal representing the greater of the first desired clutch engagement and the second desired clutch engagement; and

changing the degree of clutch engagement in response to the command signal.

9. The method of claim 8, wherein the step of issuing a command from the computer further comprises:

terminating execution in the computer of the algorithm; and

issuing from the computer a command clutch duty cycle signal causing the degree of clutch engagement to change to full clutch engagement in response to the command signal.

10. The method of claim 8, further comprising the step of:

initiating a counter in said computer upon the beginning of execution of the algorithm for monitoring the number of executions by the computer of the algorithm;

providing the computer with a data base that further includes a factor whose magnitude varies inversely with a current count;

determining from the computer data base the magnitude of the factor that corresponds to the current count of the counter;

repetitively reducing in the computer the first desired clutch engagement by the magnitude of the factor; and

issuing from the computer a command clutch duty cycle signal representing the greater of the first desired clutch engagement and the second desired clutch engagement, whereby the degree of clutch engagement is changed in response to the command signal.

11. The method of claim 8, further comprising the step of:

providing the computer with a data base that further includes a reference clutch engagement;

repetitively determining in the computer at frequent intervals during execution of the algorithm a difference between the second desired clutch engagement and the reference clutch engagement;

repetitively reducing in the computer at frequent intervals during execution of the algorithm the second desired clutch engagement by a magnitude that varies directly with said difference; and

issuing from the computer a command clutch duty cycle signal representing the greater of the first desired clutch engagement and the second desired clutch engagement, whereby the degree of clutch engagement is changed in response to the command signal.

12. The method of claim 11, wherein the step of reducing the second desired clutch engagement further comprises:

during each execution of the algorithm by the computer, subtracting from the second desired clutch engagement a magnitude that decreases as the magnitude of said difference decreases.

13. The method of claim 11, further comprising:

providing the computer with a data base that further includes a reference period length;

continuing to issue from the computer for the reference period length a command clutch duty cycle signal representing the greater of the first desired clutch engagement and the second desired clutch engagement, whereby the degree of clutch engagement is changed in response to the command signal.

14. In a transfer case, driveably connected to an engine controlled by throttle, a system for controlling a clutch that driveably connects the first output and second output with varying degrees of clutch engagement, comprising:

means for operating the clutch partially engaged;

means for determining a current throttle position, throttle rate and vehicle speed;

means for determining a first desired clutch engagement corresponding to the current throttle position and the current vehicle speed;

means for determining a second desired clutch engagement corresponding to the current throttle rate and the current vehicle speed;

means for producing a command clutch duty cycle signal representing the greater of the first desired clutch engagement and the second desired clutch engagement, whereby the degree of clutch engagement is changed in response to the command signal.

15. The system of claim 14, further comprising:

a fluid pressure source;

a servo through which the clutch is pressurized from the pressure source to change the degree of clutch engagement; and

a valve operated by a solenoid for opening communication between the pressure source and the servo in response to the clutch duty cycle command signal applied to the solenoid.

16. The system of claim 14, further comprising:

means for determining a length of a first period that begins upon initiating partial engagement of the clutch;

means for the first desired clutch engagement by a factor whose magnitude varies inversely with the length of the first period; and

means for changing the degree of clutch engagement to the greater of the first desired clutch engagement and the second desired clutch engagement.

17. The system of claim 14, further comprising:

means for maintaining the first desired clutch engagement for a second period of predetermined length.

18. The method of claim 14, further comprising:

means for determining a reference clutch engagement;

means for determining a difference between the second desired clutch engagement and the reference clutch engagement;

means for reducing the second desired clutch engagement by a magnitude that varies directly with said difference; and

means for changing the degree of clutch engagement to the greater of the first desired clutch engagement and second desired clutch engagement.

19. The method of claim 14, wherein the step of reducing the second desired clutch engagement further comprises:

subtracting from the second desired clutch engagement a magnitude that decreases as the magnitude of said difference decreases.